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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/064,254	06/26/2002	Chung-Cheng Chou	ACMP0015USA	8437

27765 7590 10/07/2003

NAIPO (NORTH AMERICA INTERNATIONAL PATENT OFFICE)  
P.O. BOX 506  
MERRIFIELD, VA 22116

EXAMINER
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LIANG, LEONARD S

ART UNIT	PAPER NUMBER
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2853

DATE MAILED: 10/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/064,254

Applicant(s)

CHOU ET AL.

Examiner

Leonard S Liang

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 July 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 18 July 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION*****Claim Rejections - 35 USC § 103***

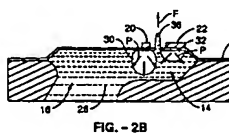
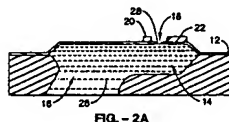
The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al (WO 9937486) in view of Lee et al (US Pat 6460961).

Kim et al discloses:

- {claim 1} A jet in flow communications with a reservoir (figure 2A); a substrate (figure 2A) having a manifold (figure 2A, reference 16) for receiving fluid from the reservoir; an orifice layer (figure 2A, reference 12) disposed above a substrate so that a plurality of chambers (figure 2A, reference 14; pages 1-3) are formed between the orifice layer and the substrate; a plurality of nozzles that are disposed on the orifice layer and correspond to the plurality of chambers for ejecting the fluid in the chambers so as to form a plurality of droplets (figure 2A, reference 18; pages 1-3; plurality of nozzles and droplets naturally suggested); an orifice (figure 2A, reference 18)



- {claim 2} an interval between the manifold and the first side is less than an interval between the manifold and the second side (figure 2A)

- {claim 3} the first bubble is used as a virtual valve for restricting fluid between the first bubble and the second bubble to avoid flowing to the manifold when the second bubble is generated (page 9, lines 11-12)
- {claim 4} each of the bubble generators is a heater, the driving circuit drives the heater(s) disposed at the first side to heat fluid in the corresponding chamber so as to generate the first bubble, and the driving circuit drives the heater(s) disposed at the second side to heat fluid in the corresponding chamber so as to generate the second bubble (figure 2A, reference 20, 22, 30, 32; page 8, lines 6-18)
- {claim 5} an interval between the manifold and the first side is less than an interval between the manifold and the second side (as taught in claim 2)
- {claim 6} the first bubble is used as a virtual valve for restricting fluid between the first bubble and the second bubble to avoid flowing to the manifold when the second bubble is generated (as taught in claim 3)
- {claims 7 and 25} there is at least one heater disposed at the first side and connected in series to one of the heater(s) disposed at the second side wherein resistance of the heater disposed at the first side is greater than resistance of the heater disposed at the second side (figure 2A; page 8, lines 6-8)
- {claims 14 and 32} the droplets are ejected from the orifice along an ejection direction, and the bubble generators are disposed in parallel at the first side and the second side (figure 2A)
- {claims 15 and 33} the bubble generator(s) disposed at the first side are arranged along a first straight line, the bubble generator(s) disposed at the second side are arranged along a second straight line, and the first straight line is parallel to the second straight line (figure 2A)
- {claim 16} A jet in flow communication with a reservoir (figure 2A); an orifice disposed above the reservoir (figure 2A, reference 18); a first bubble generator group disposed at a first side of the orifice for generating a first bubble in the reservoir (figure 2A, reference 20); a second bubble generator group disposed at

a second side of the orifice for generating a second in the reservoir, the first bubble and the second bubble squeezing fluid between the first bubble and the second bubble out of the orifice to form a droplet (figure 2A, reference 30, 32);

- {claim 17} each of the bubble generators is a heater (figure 2A, reference 20, 22)
- {claim 19} a resistance value of each of the bubble generator(s) disposed at the first side is different from a resistance value of each of the bubble generator(s) disposed at the second side (figure 2B, reference 20, 22; heater 20 and 22 have different widths and therefore different resistance values)
- {claim 23} a manifold for receiving fluid from the reservoir (figure 2A-2D, reference 16), wherein the first bubble is used as a virtual valve to restrict fluid to avoid flowing to the manifold (page 9, lines 11-12)
- {claim 24} a driving circuit electrically connected to the bubble generators and wherein each of the bubble generators is a heater, the driving circuit drives the heater(s) disposed at the first side to heat fluid so as to generate the first bubble, and the driving circuit drives the heater(s) disposed at the second side to heat fluid so as to generate the second bubble (figure 2A-2D; pages 3-5)

Kim et al differs from the claimed invention in that it does not disclose:

- {claim 1} at least three distinct bubble generators electrically connected to a driving circuit and disposed at a first side of the orifice and a second side of the orifice, at least two of the bubble generators disposed at one of either the first side or the second side, and at least one of the bubble generators disposed at the other of the first side and the second side, the driving circuit driving the bubble generator(s) disposed at the first side to generate a first bubble in a corresponding chamber and driving the bubble generator(s) disposed at the second side to generate a second bubble in the corresponding chamber; wherein the driving circuit drives the bubble generators selectively so that each of the nozzles is capable of ejecting droplets of different sizes
- {claims 8 and 26} each of the heater(s) disposed at the first side connects in series to one of the heater(s) disposed at the second side

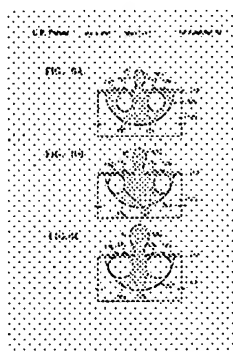
- {claims 9 and 27} at least two heaters are disposed at the first side, and each of the nozzles comprises a leading wire for connecting one of the heater(s) disposed at the second side with the heaters disposed at the first side, and the drawing circuit applies a voltage on at least one of the heaters disposed at the first side to generate the first bubble and the second bubble simultaneously
- {claims 10 and 28} at least two heaters are disposed at the second side, and each of the nozzles comprises a leading wire for connecting one of the heater(s) disposed at the first side with the heaters disposed at the second side and the driving circuit applies a voltage on at least one of the heaters disposed at the second side to generate the first bubble and the second bubble simultaneously
- {claims 11 and 29} there is at least one heater disposed at the first side connected in parallel to one of the heater(s) disposed at the second side, wherein a resistance of the heater disposed at the first side is less than a resistance of the heater disposed at the second side
- {claims 12 and 30} the orifice layer comprises at least two structure layers arranged in parallel, and there is at least one heater disposed on each of the structure layers
- {claims 13 and 31} the droplets are ejected from the orifice along an ejection direction, and at least two of the heaters are disposed on the two structure layers linearly along the ejection direction
- {claim 16} wherein the first bubble generator group or the second bubble generator group comprises at least two independently drivable bubble generators for generating the first bubble or the second bubble, and the other of the first bubble generator group or the second bubble generator group comprises at least one distinct bubble generator
- {claim 18} an interval between the orifice and one of the two bubble generators is different from an interval between the orifice and the other one of the two bubble generators
- {claim 20} each of the three bubble generators has a unique resistance value

Art Unit: 2853

- {claim 21} a resistance value of each of the bubble generator(s) in the first bubble generator group is different from a resistance value of each of the bubble generator(s) in the second bubble generator group
- {claim 22} each of the bubble generators in the first bubble generator group and the second bubble generator group has a unique resistance value

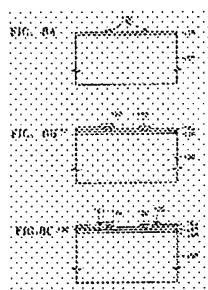
Lee et al discloses:

- {claim 1} at least three distinct bubble generators electrically connected to a driving circuit and disposed at a first side of the orifice and a second side of the orifice, at least two of the bubble generators disposed at one of either the first side or the second side, and at least one of the bubble generators disposed at the other of the first side and the second side, the driving circuit driving the bubble generator(s) disposed at the first side to generate a first bubble in a corresponding chamber and driving the bubble generator(s) disposed at the second side to generate a second bubble in the corresponding chamber; wherein the driving circuit drives the bubble generators selectively so that each of the nozzles is capable of ejecting droplets of different sizes (abstract; figures 6A-6C; column 2, lines 1-46)



- {claims 9 and 27} at least two heaters are disposed at the first side, and each of the nozzles comprises a leading wire for connecting one of the heater(s) disposed at the second side with the heaters disposed at the first side, and the drawing circuit applies a voltage on at least one of the heaters disposed at the first side to generate the first bubble and the second bubble simultaneously (figure 6A, reference 120, 150; figure 2, reference 130, 160, 170, 180; column 4, lines 8-47)

- {claims 10 and 28} at least two heaters are disposed at the second side, and each of the nozzles comprises a leading wire for connecting one of the heater(s) disposed at the first side with the heaters disposed at the second side and the driving circuit applies a voltage on at least one of the heaters disposed at the second side to generate the first bubble and the second bubble simultaneously (as taught in claim 9)
- {claims 11 and 29} there is at least one heater disposed at the first side connected in parallel to one of the heater(s) disposed at the second side (column 4, lines 38-43)
- {claims 12 and 30} the orifice layer comprises at least two structure layers arranged in parallel, and there is at least one heater disposed on each of the structure layers (figure 8C)



- {claims 13 and 31} the droplets are ejected from the orifice along an ejection direction, and at least two of the heaters are disposed on the two structure layers linearly along the ejection direction (figure 8C)
- {claim 16} wherein the first bubble generator group or the second bubble generator group comprises at least two independently drivable bubble generators for generating the first bubble or the second bubble, and the other of the first bubble generator group or the second bubble generator group comprises at least one distinct bubble generator (abstract; figures 6A-6C; column 2, lines 1-46)
- {claim 18} an interval between the orifice and one of the two bubble generators is different from an interval between the orifice and the other one of the two bubble generators (figure 6A, reference 120, 150)



It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Lee et al into the invention of Kim et al so that there are at least three bubble generators wherein at least two heaters are disposed on one side; the nozzles comprise a leading wire for connecting the heaters; the orifice layer comprises at least two structure layers arranged in parallel where there is at least one heater disposed on each of the structure layers; and an interval between the orifice and one of the two bubble generators is different from an interval between the orifice and the other one of the two bubble generators. The motivation for the skilled artisan in doing so is to gain the benefit of obtaining a bubble-jet type ink jet print head that is easy to manufacture and that can easily produce varying shades of gray by energizing specific ones or a plurality of heaters for each nozzle hole producing ink droplets of varying sizes depending on what combination of heaters are energized (column 1, lines 42-47). The combination naturally suggests that each of the heater(s) disposed at the first side connects in series to one of the heater(s) disposed at the second side and wherein a resistance of the heater disposed at the first side is less than a resistance of the heater disposed at the second side. The combination also naturally suggests that each bubble generator has a unique resistance value and that a resistance value of each of the bubble generator(s) in the first bubble generator group is different from a resistance value of each of the bubble generator(s) in the second bubble generator group.

### *Response to Arguments*

2. Applicant's arguments filed 07/18/03 have been fully considered but they are not persuasive.

The applicant's main argument is directed to the fact that Kim et al and Lee et al disclose only two distinct bubble generators, and not the three distinct bubble generators that are claimed. While the examiner agrees that Lee et al only shows two bubble generators 120 and 150 in the figures, Lee et al also clearly discloses "The heater includes **two or more heating elements**...Each heating element is coupled to an electrode for applying heater drive power independently." The term two or more suggests that there can be three distinct bubble generators, though only two are shown in the figures. The examiner maintains that Kim et al in view of Lee et al reads on the claimed invention as demonstrated in the above rejection.

***Conclusion***

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Min et al (US Pat 6595627) discloses an inkjet printhead and manufacturing method thereof.

Chen et al (US PgPub 2003/0137559 A1) discloses an integrated inkjet print head with rapid ink refill mechanism and off-shooter heater.

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

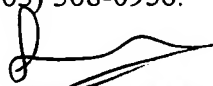
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonard S Liang whose telephone number is (703) 305-4754. The examiner can normally be reached on 8:30-5 Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (703) 308-4896. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

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**Stephen D. Meier**  
Primary Examiner